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LISTS OF SPECIES

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New and recent records of moth and butterfly species (Insecta: Lepidoptera) from Praslin and Mahé Islands, Seychelles

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Abstract: We report recent records of 17 Lepidoptera species from 15 genera and 11 families, which were collected on the Inner Seychelles in January 2013. From Praslin Island, 11 species, including two Seychelles endemics, were recorded for the first time. These records have significantly expanded the list of the lepidopteran fauna of Praslin to 54 species. Four species were newly collected after a long-term (ca. 50 years) absence of their specimens in samples from the Seychelles archipelago. In addition, seven species were rediscovered from separate islands. Our findings highlight that there is some evidence of faunal exchange between the two largest islands of the granitic Seychelles and that the lepidopteran fauna of Praslin has been largely underestimated.

Key words: Indian Ocean islands, endemic, island biogeography

INTRODUCTION

The history of lepidopteran studies of the Inner Seychelles spans one hundred years; all these data were summarised in the comprehensive monograph (Gerlach and Matyot 2006). According to this source, the largest granitic islands have the greatest number of species: 345 on Mahé and 288 on Silhouette. In contrast, the second largest and third highest island, Praslin, has only 43 recorded species (Gerlach and Matyot 2006; Bolotov et al. 2014a). The Lepidoptera faunas of small islands are usually not species rich; e.g., 40 species were recorded on Curieuse Island (Woods 2013) and 24 species were collected on Cousine Island (Lawrence 2005). However, St. Anne Island, with 77 recorded species, shows an exceptionally high level of species richness, considering island size, probably due to its close proximity to Mahé (Gerlach and Matyot 2006).

The taxonomy, species composition, faunal affinities, and biology of lepidopterans of the granitic Seychelles islands were discussed in numerous works (Fletcher 1910; Legrand 1965; Lionnet 1984; Floater 1993; Lawrence 2000; Matyot 2005; Gerlach and Matyot 2006; Woods 2013; Bolotov et al. 2014a, 2014b). For certain butterfly species, the life cycle, daily activity, habitat preference, larval and imago feeding sources, and morphological variability were examined (Lawrence 2004, 2009, 2014). Gerlach (2008) estimated the conservation status of lepidopteran species and other insect taxa of the Seychelles islands and determined that 21% of Lepidoptera taxa are threatened, including 102 moth and four butterfly species.

In this paper, we present a list of recent records of lepidopterans from two of the largest islands of the Inner Seychelles. These records significantly increase the number of known species in the fauna of Praslin Island and add several noticeable occurrences from Mahé Island.

MATERIALS AND METHODS

This study based on the examination of 20 pinned specimens, which were selectively collected by I. N. Bolotov in three localities on Praslin Island and one locality on Mahé Island in January 2013 (Table 1; Figures 1a and 1b). The materials are deposited in the collection of the Russian Museum of Biodiversity Hotspots (RMBH) of the Institute of Ecological Problems of the North of the Ural Branch of the Russian Academy of Sciences, Arkhangelsk city, Russia (INEP). In addition, field observations were provided for several species. The majority of taxon names were checked using the Global Lepidoptera Names Index (Beccaloni et al. 2003) and the Afromoths Online Database (De Prins and De Prins 2015).

The specimens' images were obtained with a digital camera (Canon EOS™ 450D, Canon Inc., Japan). The

Table 1. Collecting localities mentioned in the text

Code	Island	Locality name	Latitude	Longitude	Altitude, m a.s.l.	Habitat
Pr1	Praslin	Anse Possession	04°18′36″ S	055°43′45″ E	5	Coastal lowlands
Pr2	Praslin	Salazie Stream	04°19′20″ S	055°44′03″ E	170	Plateau; mid-altitude cinnamon forest
Pr3	Praslin	Pasquere No. 1 Stream	04°19′10″ S	055°43′25″ E	110	Same habitat
Ma1	Mahé	Au Cap	04°42′59″ S	055°31′14″ E	40	Hill slope; disturbed mid-altitude forest dominated by palms and cinnamon trees

Figure 1. The typical habitats of Lepidoptera on Praslin Island, Inner Seychelles: (**a**) Coastal lowland (Pr1), habitat of many species, namely, elachistid moth *Ethmia nigroapicella*, crambids *Cirrhochrista perbrunnealis*, *Cadarena pudoraria* and *Omiodes indicata*, noctuids *Spodoptera mauritia* and *S. cilium*, erebids *Achaea* spp. and geometrid moth *Erastria madecassaria*; (**b**) Mid-altitude cinnamon forest on the island plateau (Pr2), habitat of *Zebronia mahensis*, an endemic crambid moth species.

genitalia dissections were performed using standard methods for lepidopterans. We macerated the abdomen in hot 10% KOH solution during 5–10 minutes. The genitalia of small-sized species were stained using the Giemsa's azur-eosin-methylene blue solution according to the standard protocol. The processed genitalia were placed in permanent slides with Histofluid® (Paul Marienfeld GmbH & Co., Germany). The genitalia images were obtained using a stereomicroscope (SteREO Discovery.V8, Carl Zeiss, Germany). All images were arranged with Adobe Photoshop© CS version 8.0.

RESULTS

Seventeen Lepidoptera species from 15 genera and 11 families were recorded on the two islands of the Inner Seychelles (13 species on Praslin Island and four species on Mahé Island). These species are illustrated in Figures 2(a–h), 3(a–h) and 4(a–g).

Species account

Family Elachistidae

Ethmia nigroapicella (Saalmüller, 1880) (Figure 2a)

Material examined: Pr1: 2 specimens 5–8.i.2013 (INEP-g0932, INEP-g0933).

Remarks: Indo–Pacific; first occurrence on Praslin Island (Gerlach and Matyot 2006: 24); recently recorded on Curieuse Island (Woods 2013).

Family Crambidae

Zebronia mahensis (Fletcher, 1910) (Figure 2b)

Material examined: Pr2: 1♀ 20.i.2013 (INEP-g0770).

Remarks: A common species in the locality (I. N. Bolotov, pers. observ.). Endemic; first occurrence on Praslin Island (Gerlach and Matyot 2006: 44).

Cirrhochrista perbrunnealis Fletcher, 1910 (Figures 2c–2f)

Material examined: Pr1: 1♂ 1♀ 5–8.i.2013 (INEP-g0768, INEP-g0769).

Remarks: Endemic; first occurrence on Praslin Island (Gerlach and Matyot 2006: 46); recently recorded on Curieuse Island (Woods 2013).

Cadarena pudoraria (Hübner, 1825) (Figure 2g)

Material examined: Pr1: 1 specimen 5–8.i.2013 (INEP-g0934).

Remarks: Palaeotropical; first occurrence on Praslin Island and first recent record from the Seychelles islands since 1960 (Gerlach and Matyot 2006: 46).

Omiodes indicata (Fabricius, 1775), = *O. dnopheralis* (Mabille, 1900) (Figure 2h)

Material examined: Pr1: 1 specimen 5–8.i.2013 (INEP-g0935).

Remarks: Pantropical; first occurrence on Praslin Island (Gerlach and Matyot 2006: 51); recently recorded on Curieuse Island (Woods 2013).

Family Tortricidae

Cryptophlebia peltastica (Meyrick, 1921) (Figure 3a)

Material examined: Ma1: 1 specimen 24.i.2013 (INEP-g0943).

Remarks: Palaeotropical; first recent record on Mahé Island since 1959 (Gerlach and Matyot 2006: 61).

Family Geometridae

Erastria madecassaria (Boisduval, 1833) (Figure 3b)

Material examined: Pr1: 2 specimens 5–8.i.2013 (INEP-g0930, INEP-g0931).

Remarks: Africa, Madagascar; first occurrence on Praslin Island (Gerlach and Matyot 2006: 66); recently recorded on Curieuse Island (Woods 2013). Two collected

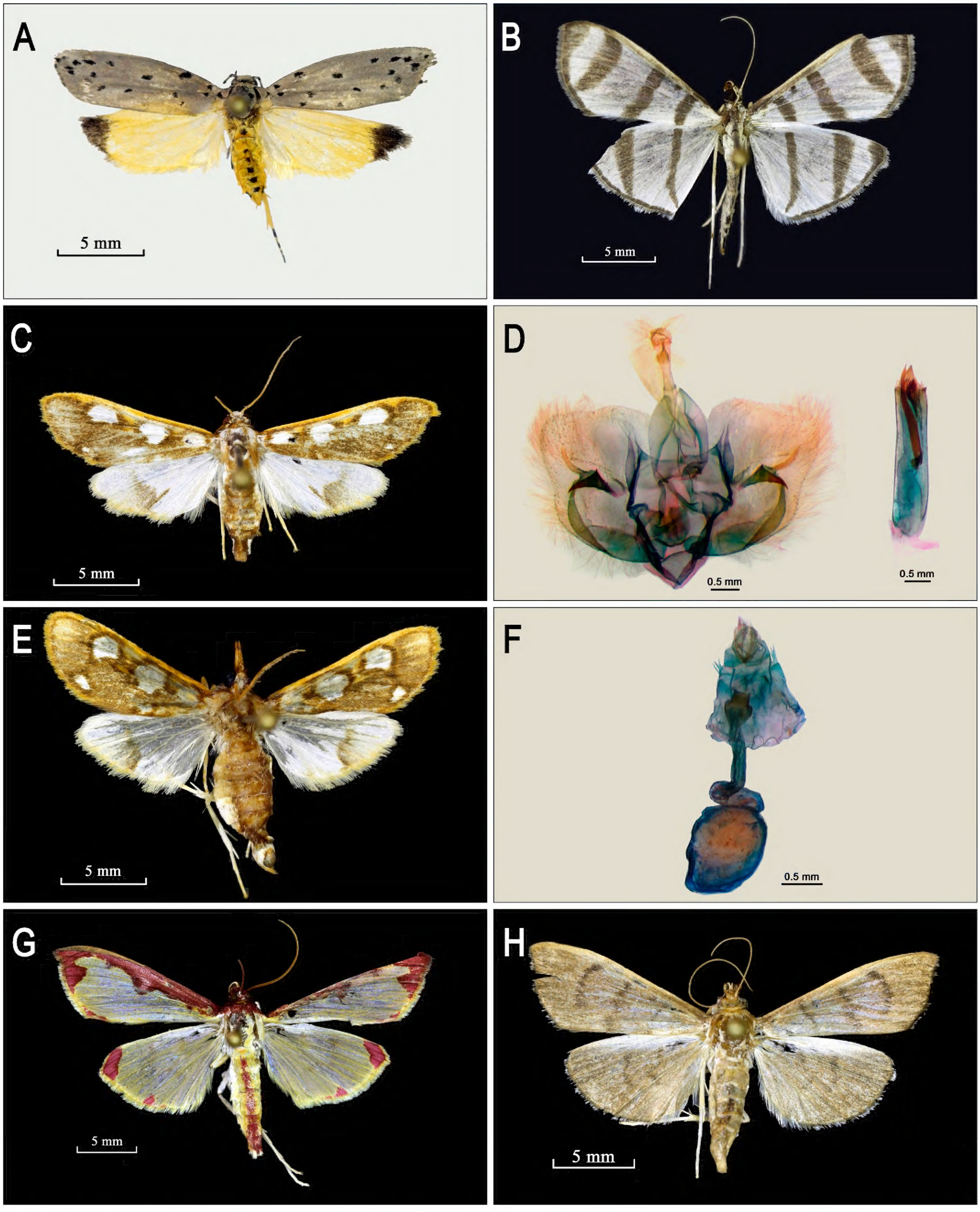

Figure 2. Certain Lepidoptera species from the Inner Seychelles, (**a**) *Ethmia nigroapicella*, Praslin Island; (**b**) endemic species *Zebronia mahensis*, Praslin Island: female specimen; (**c**) endemic species *Cirrhochrista perbrunnealis*, Praslin Island: male specimen; (**d**) ditto: male genitalia (ventral view) and phallus (lateral view); (**e**) ditto: female specimen; (**f**) ditto: female genitalia (ventral view); (**g**) *Cadarena pudoraria*, Praslin Island; (**h**) *Omiodes indicata*, Praslin Island.

specimens have specific color patterns on the upper side of forewings, which are differ in comparison with individuals from other regions.

Family Uraniidae

Phazaca theclata (Guenée, 1857) (Figure 3c)

Material examined: Ma1: 1 specimen 24.i.2013 (INEP-g0942).

Remarks: Palaeotropical; first recent record on Mahé Island since 1960 (Gerlach and Matyot 2006: 68); recently recorded on Curieuse Island as an abundant species (58 specimens, 26.5% of the total lepidopteran sample) (Woods 2013).

Family Erebidae

Achaea oedipodina Mabille, 1879 (Figures 3d and 3e)

Material examined: Pr1: 1♂ 13.i.2013 (INEP-g0766).

Remarks: Africa, Madagascar; first occurrence on Praslin Island and first recent record from the Seychelles islands since 1979 (Gerlach and Matyot 2006: 76).

Achaea violaceofascia (Saalmüller, 1891) (Figures 3f and 3g)

Material examined: Pr1: 1♂ 5–8.i.2013 (INEP-g0765).

Remarks: Madagascar, Mascarenes; first occurrence on Praslin Island and first record since 1999 from the Seychelles islands (Gerlach and Matyot 2006: 76). The Mascarene subspecies *A. v. richardi* Viette, 1976 occurs on the Seychelles islands.

Family Euteliidae

***Eutelia discitriga* Walker, 1865** (Figure 3h)

Material examined: Ma1: 1 specimen 24.i.2013 (INEP-g0944).

Remarks: Palaeotropical; first recent record on Mahé Island since 1960 and first record since 1999 from the Seychelles islands (Gerlach and Matyot 2006: 80).

Family Noctuidae

Spodoptera cilium Guenée, 1852 (Figure 4a)

Material examined: Pr1: 1 specimen 17.i.2013 (INEP-g0941).

Remarks: Palaeotropical; first occurrence on Praslin Island and first recent record from the Seychelles islands since 1960 (Gerlach and Matyot 2006: 82).

Spodoptera mauritia (Boisduval, 1833) (Figure 4b)

Material examined: Pr1: 1 specimen 5–8.i.2013 (INEP-g0940).

Remarks: Indo–Pacific; first occurrence on Praslin Island and first recent record from the Seychelles islands since 2003 (Gerlach and Matyot 2006: 82).

Family Nolidae

Earias biplaga Walker, 1866 (Figure 4c)

Material examined: Pr1: 1 specimen 17.i.2013 (INEP-g0936).

Remarks: Africa; first occurrence on Praslin Island and first recent record from the Seychelles islands since 1959 (Gerlach and Matyot 2006: 87). Our specimen belongs to a plain form with reduced brown medial spots on the forewings.

Family Hesperiidae

Eagris sabadius (Gray, 1832) (Figures 4d and 4e)

Material examined: Ma1: 1♂ 24.i.2013 (INEP-g0767).

Remarks: Africa; first recent record on Mahé Island since 1960 and first recent record from the Seychelles islands since 2000 (Gerlach and Matyot 2006: 92). *E. s. maheta* Evans, 1937, an endemic subspecies, has been described from the Inner Seychelles. The collected specimen was attracted by light in the early morning.

Family Lycaenidae

Leptotes pirithous (Linnaeus, 1767) (Figure 4f)

Material examined: Pr3: 2 specimens 7.i.2013 (INEP-g0938, INEP-g0939).

Remarks: Africa, Madagascar; first recent record on Praslin Island since 1905 (Gerlach and Matyot 2006: 95); recently recorded on Curieuse Island (Woods 2013).

Zizeeria knysna (Trimen, 1862) (Figure 4g)

Material examined: Pr1: 1 specimen 13.i.2013 (INEP-g0937).

Remarks: A common species in gardens and other anthropogenic habitats on Praslin Island (I. N. Bolotov, pers. observ.); abundant on Curieuse Island (Woods 2013). Widespread: Europe, Africa, Madagascar; first recent record on Praslin Island since 2003 (Gerlach and Matyot 2006: 95).

DISCUSSION

Seventeen lepidopteran species were collected from the two of the largest islands of the Inner Seychelles in January 2013. A total of 11 species were recorded on Praslin Island for the first time. These records have significantly increase the richness of the Lepidoptera fauna of Praslin to 54 species (Gerlach and Matyot 2006; Bolotov et al. 2014a). Four species, namely, *Cadarena pudoraria*, *Cryptophlebia peltastica*, *Spodoptera cilium* and *Earias biplaga*, were collected after a long-term (ca. 50 years) absence in samples from the Seychelles islands (Legrand 1965; Gerlach and Matyot 2006).

The our collections from Praslin Island are new species' records for the island fauna, including the crambid moths *Zebronia mahensis* and *Cirrhochrista perbrunnealis*, which were previously considered as endemics of Mahé and Silhouette. Gerlach and Matyot (2006) assumed that Praslin Island has a poor lepidopteran fauna, probably due to the lower altitude of this island than that of Mahé and Silhouette islands. However, our data reveal the assumption that the fauna

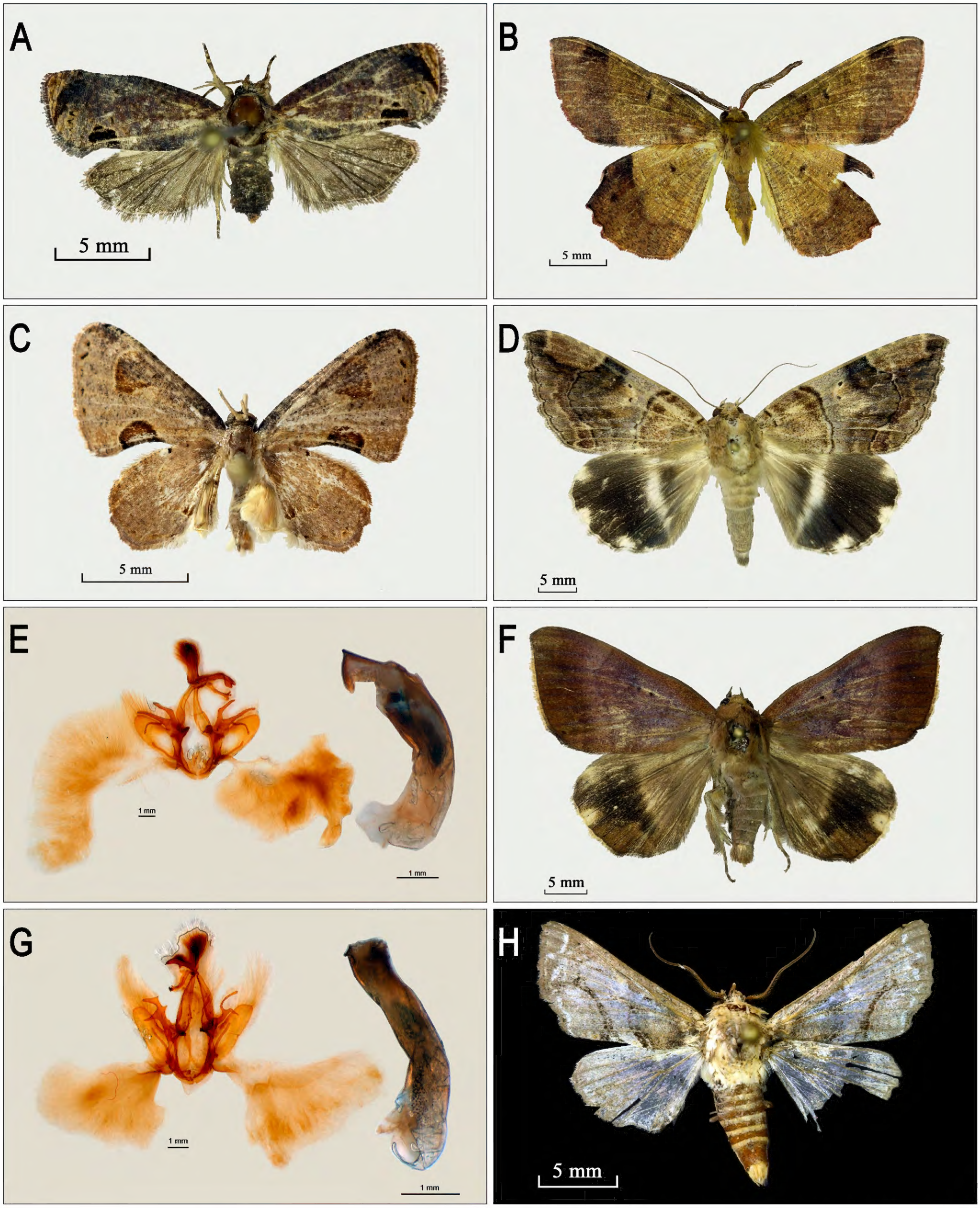

Figure 3. Certain Lepidoptera species from the Inner Seychelles, (**a**) *Cryptophlebia peltastica*, Mahé Island; (**b**) *Erastria madecassaria*, Praslin Island; (**c**) *Phazaca theclata*, Mahé Island; (**d**) *Achaea oedipodina*, Praslin Island; (**e**) ditto: male genitalia (ventral view) and phallus (lateral view); (**f**) *Achaea violaceo-fascia richardi*, Praslin Island; (**g**) ditto: male genitalia (ventral view) and phallus (lateral view); (**h**) *Eutelia discitriga*, Mahé Island.

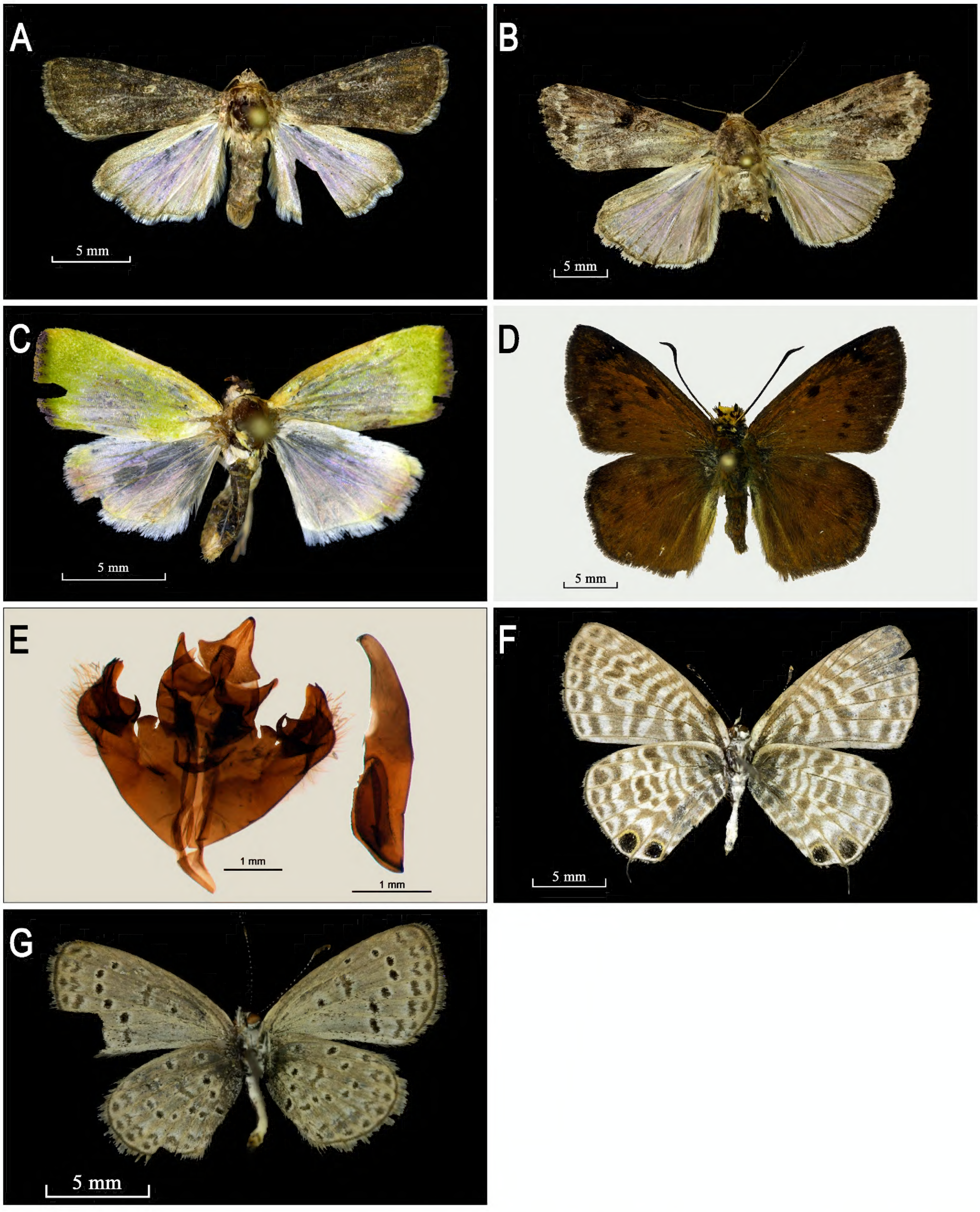

Figure 4. Certain Lepidoptera species from the Inner Seychelles, (**a**) *Spodoptera cilium*, Praslin Island; (**b**) *Spodoptera mauritia*, Praslin Island; (**c**) *Earias biplaga*, Praslin Island; (**d**) endemic subspecies *Eagris sabadius maheta*, Mahé Island; (**e**) ditto: male genitalia (ventral view) and phallus (lateral view); (**f**) *Leptotes pirithous*, Praslin Island; (**g**) *Zizeeria knysna*, Praslin Island.

is poor most likely an artifact of insufficient collections and incomplete knowledge of the fauna of Praslin Island, rather entirely because the island's elevation. We believe that the lepidopteran fauna of Praslin Island is much richer than previously believed (Gerlach and Matyot 2006) and may include at least 100 species. This assumption is confirmed by preliminary results of the study of Lepidoptera on Curieuse Island, the island closest to (within ~ 1 km) Praslin. On Curieuse Island, 30 species were collected from a single coastal locality (Woods 2013).

At their closest, Praslin and Mahé islands are 43 km apart. An intensive flow of migrant butterflies was recorded on several northern European islands, which are isolated from the mainland by ~25 km (Bolotov et al. 2013), but certain Lepidoptera species can also migrate across huge oceanic barriers (Fox 1978; Hoare 2001). Lawrence (2005, 2011, 2014) and Gerlach and Matyot (2006) showed that several species arrived to the Inner Seychelles from the mainland or remote islands across a distance of over 1,000 km, e.g., *Vanessa cardui* (L., 1758), *Hypolimnas bolina* (L., 1758), *H. misippus* (L., 1764) and *Agrius convolvuli* (L., 1758). According to (Lawrence 2005, 2011, 2014; Gerlach and Matyot 2006) and newly collected materials, we suggest the presence of faunal exchange between the two largest islands of the granitic Seychelles. However, vagrant individuals could successfully colonize new islands, if they find suitable environmental conditions (Hoare 2001; Bolotov et al. 2013).

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